201-14499

Safety, Health & Environment Excellence Center
1007 Market Street, DuPont 6082
Wilmington, DE 19898
302-773-0910 (Office) – 302-774-3140 (Fax)

December 17, 2002

Christine Todd Whitman, Administrator
U.S. Environmental Protection Agency
P.O. Box 1473
Merrifield, VA 2216

Attn: Chemical Right-to-Know Program

Dear Administrator Whitman,

E. I. du Pont de Nemours & Company, Inc. is pleased to submit the proposed test plan along with the robust summary for the chemical Carbamate Hydrochloride, CAS# 65206-90-8. This chemical is a closed system intermediate, therefore, has a reduced test plan. DuPont understands there will be a 120-day review period for the test plan and that all comments received by the EPA will be forwarded to DuPont for consideration.

This submission includes one electronic copy in .pdf format.

Please feel free to contact me with any questions or concerns you may have with regards to this submission at Edwin.L.Mongan-1@usa.dupont.com or by phone at 302-773-0910.

Sincerely,

Edwin L. Mongan, III
Manager, Environmental Stewardship
DuPont Safety, Health & Environment

Cc: Charles Auer – U.S. EPA
Office of Pollution Prevention & Toxics
U. S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

December 17, 2002

TEST PLAN FOR CARBAMATE HYDROCHLORIDE

Carbamate Hydrochloride CAS No. 65206-90-8	**Data Available**	**Data Acceptable**	**Testing Required**
Study	**Y/N**	**Y/N**	**Y/N**
PHYSICAL/CHEMICAL CHARACTERISTICS			
Melting Point	Y	Y	N
Boiling Point	Y	Y	N
Vapor Pressure	Y	Y	N
Partition Coefficient	Y	Y	N
Water Solubility	Y	Y	N
ENVIRONMENTAL FATE			
Photodegradation	Y	Y	N
Stability in Water	Y	Y	N
Transport (Fugacity)	Y	Y	N
Biodegradation	Y	Y	N
ECOTOXICITY			
Acute Toxicity to Fish	Y	N	Y
Acute Toxicity to Invertebrates	Y	N	Y
Acute Toxicity to Aquatic Plants	Y	N	Y
MAMMALIAN TOXICITY			
Acute Toxicity	Y	Y	N
Repeated Dose Toxicity	N/A	N/A	N/A
Developmental Toxicity	N	N	Y
Reproductive Toxicity	N/A	N/A	N/A
Genetic Toxicity Gene Mutations	N	N	Y
Genetic Toxicity Chromosomal Aberrations	N	N	Y
Y = Yes N= No N/A = Not Applicable			

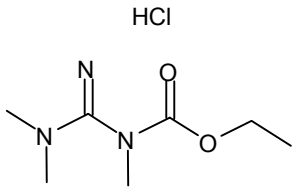
Existing published and unpublished data were collected and scientifically evaluated to determine the best possible study or studies to be summarized for each required endpoint. In the spirit of this voluntary program, other data of equal or lesser quality are not summarized, but are listed as related references at the end of each appropriate section, with a statement to reflect the reason why these studies were not summarized.

1.0 Substance Information

CAS Number: 65206-90-8

Chemical Name: Carbamate hydrochloride

Structural Formula:



Other Names: Carbamic acid, (aminoiminomethyl)methyl-, dimethyl deriv., ethyl ester monohydrochloride

F-3455.HCl

Exposure Limits: No Data.

2.0 Physical – Chemical Properties

2.1 Melting/Freezing Point:

Value:	F3455.HCl: No Data Product as shipped: -49.4ºC (Freezing Point)
Decomposition:	No Data
Pressure:	No Data
Method:	No Data
GLP:	Unknown
Reference:	DuPont Co. (1996). Material Data Safety Sheet No. B0000006 (May 24).
Reliability:	Not assignable because limited study information was available.

Additional References for Boiling Point: None Found.

2.2 Boiling Point:

Value:	F3455.HCl: Not applicable

	Product as shipped: 105ºC
Decomposition:	No Data
Pressure:	No Data
Method:	No Data
GLP:	Unknown
Reference:	DuPont Co. (1996). Material Data Safety Sheet No. B0000006 (May 24).
Reliability:	Not assignable because limited study information was available.

Additional References for Boiling Point: None Found.

2.3 Density:

Value:	F3455.HCl: Not applicable Product as shipped: 69.7 lb/ft^3
Temperature:	23ºC
Method:	No Data
GLP:	Unknown
Results:	No additional data.
Reference:	DuPont Co. (1996). Material Data Safety Sheet No. B0000006 (May 24).
Reliability:	Not assignable because limited study information was available.

Additional References for Density: None Found.

2.4 Vapor Pressure:

Value:	F3455.HCl: Not applicable Product as shipped: 18 mm Hg
Temperature:	21ºC
Decomposition:	No Data
Method:	No Data
GLP:	Unknown
Reference:	DuPont Co. (1996). Material Data Safety Sheet No. B0000006 (May 24).
Reliability:	Not assignable because limited study information was available.

Additional References for Vapor Pressure: None Found.

2.5 Partition Coefficient (log Kow):

Value:	F-3455.HCl: -0.07
Temperature:	25^{o}C

Method:	Modeled. KOWWIN, v. 1.66, module of EPIWINN 3.05 (Syracuse Research Corporation). KOWWIN uses "fragment constant" methodologies to predict log P.
GLP:	Not applicable
Reference:	Meylan, W. M. and P. H. Howard (1995). J. Pharm. Sci., 84:83-92.
Reliability:	Estimated based on an accepted model.

Additional References for Partition Coefficient (log Kow): None Found.

2.6 Water Solubility:

Value:	F3455.HCl: At least 50% Product as shipped: Infinite
Temperature:	No Data
pH/pKa:	No Data
Method:	No Data
GLP:	Unknown
Reference:	DuPont Co. (2000). Unpublished Data.
Reliability:	Not assignable because limited study information was available.

Additional References for Water Solubility: None Found.

2.7 Flash Point:

Value:	F3455.HCl: Not applicable Product as shipped: 60ºC
Method:	TCC
GLP:	Unknown
Reference:	DuPont Co. (1996). Material Data Safety Sheet No. B0000006 (May 24).
Reliability:	Not assignable because limited study information was available.

Additional References for Flash Point: None Found.

2.8 Flammability: No Data.

3.0 Environmental Fate

3.1 Photodegradation:

Concentration: No Data

Temperature:	No Data
Direct Photolysis:	Inspection of F-3455.HCl indicates that it may be subject to aquatic photodegradation.
Indirect Photolysis:	No Data
Breakdown Products:	No Data
Method:	Inspection of chemical structure
GLP:	Not Applicable
Reference:	Harris, J. C. (1990). Rate of Aqueous Photolysis, Chapter 8 In Lyman, W. J. et al. (eds.). Handbook of Chemical Property Estimation Methods, American Chemical Society, Washington, DC.
Reliability:	Estimate based on known qualitative structure-activity relationships.

Additional References for Photodegradation: None Found.

3.2 Stability in Water:

Concentration:	No Data
Half-life:	Hydrolyses very slowly (> 10 years at pH 7) in water.
% Hydrolyzed:	No Data
Method:	Modeled. HYDROWIN, v. 1.67 module of EPIWINN v3.05 (Syracuse Research Corporation). HYDROWIN estimates aqueous hydrolysis rate constants for the following chemical classes: esters, carbamates, epoxides, halomethanes and selected alkyl halides. HYDROWIN estimates acid- and base-catalyzed rate constants; it does NOT estimate neutral hydrolysis rate constants. The prediction methodology was developed for the U.S. Environmental Protection Agency and is outlined in Mill et al., 1987.
GLP:	Not Applicable
Reference:	Mill, T. et al. (1987). "Environmental Fate and Exposure Studies Development of a PC-SAR for Hydrolysis: Esters, Alkyl Halides and Epoxides" EPA Contract No. 68-02-4254, SRI International Menlo Park, CA.
Reliability:	Estimate based on an accepted model.

Additional References for Stability in Water: None Found.

3.3 Transport (Fugacity):

Media:	For F-3455.HCl Air, Water, Soil, and Sediments

Compartment	% of total distribution	½ life (hours) (advection + reaction)
Air	0.005	15.1
Water	45	360
Soil	54.9	720
Sediment	0.08	3240

Adsorption Coefficient: Log Koc = 0.349

Desorption: No Data

Volatility: Henry's Law Constant = 1.53×10^{-10} atm-m^2/mole

Method: Modeled, using 50% (w/v) water solubility value.

Henry's Law Constant - HENRYWINN v. 3.10 module of EPIWINN v3.05 (Syracuse Research Corporation). Henry's Law Constant (HLC) is estimated by two separate methods that yield two separate estimates. The first method is the bond contribution method and the second is the group contribution method. The bond contribution method is able to estimate many more types of structures; however, the group method estimate is usually preferred (but not always) when all fragment values are available.

Log Koc – Calculated from log Kow by the Mackay Level III fugacity model incorporated into EPIWINN v3.05 (Syracuse Research Corporation).

Environmental Distribution - Mackay Level III fugacity model, in EPIWINN v3.05 (Syracuse Research Corporation). Emissions (1000 kg/hr) to air, water, and soil compartments.

GLP: Not Applicable

Reference: HENRYWIN – Hine, J. and P. K. Mookerjee (1975). J. Org. Chem., 40(3):292-8 and Meylan, W. and P. H. Howard (1991). Environ. Toxicol. Chem., 10:1283-93.

Fugacity - The methodology and programming for the Level III fugacity model incorporated into EPIWIN v3.05 (Syracuse Research Corporation) were developed by Dr. Donald MacKay and coworkers and are detailed in:
Mackay, D. (1991). Multimedia Environmental Models: The Fugacity Approach, pp. 67-183, Lewis Publishers, CRC Press.
Mackay, D. et al. (1996). Environ. Toxicol. Chem., 15(9):1618-1626.
Mackay, D. et al. (1996). Environ. Toxicol. Chem., 15(9):1627-1637.

Reliability:	Estimated values based on accepted model.

Additional References for Transport (Fugacity): None Found.

3.4 Biodegradation:

Value:	Estimated half-life: 15 days, estimated to be readily biodegradable
Ultimate Biodegradation Timeframe:	Weeks
Breakdown Products:	No Data
Method:	Modeled. BIOWIN, v. 4.0 module of EPINWINN v3.05 (Syracuse Research Corporation). BIOWIN estimates the probability for the rapid aerobic biodegradation of an organic chemical in the presence of mixed populations of environmental microorganisms. Estimates are based upon fragment constants that were developed using multiple linear and non-linear regression analyses.
GLP:	Not applicable
Reference:	Boethling, R. S. et al. (1994). Environ. Sci. Technol., 28:459-65. Howard, P. H. et al. (1992). Environ. Toxicol. Chem., 11:593-603. Howard, P. H. et al. (1987). Environ. Toxicol. Chem., 6:1-10. Tunkel, J. et al. (2000). "Predicting Ready Biodegradability in the MITI Test" Environ. Toxicol. Chem., accepted for publication.
Reliability:	Estimated value based on accepted model.

Additional References for Biodegradation: None Found.

3.5 Bioconcentration:

Value:	BCF = 3.162
Method:	Modeled. BCFWIN v. 2.4 module of EPINWINN v3.05 (Syracuse Research Corporation). BCFWIN estimates the bioconcentration factor (BCF) of an organic compound using the compound's log octanol-water partition coefficient (Kow) with correction factors based on molecular fragments.
GLP:	Not applicable
Reference:	"Improved Method for Estimating Bioconcentration Factor (BCF) from Octanol-Water Partition Coefficient", SRC TR-97-006 (2nd Update), July 22, 1997; prepared for:

	Robert S. Boethling, EPA-OPPT, Washington, DC; Contract No. 68-D5-0012; prepared by: William M. Meylan, Philip H. Howard, Dallas Aronson, Heather Printup and Sybil Gouchie; Syracuse Research Corp.
Reliability:	Estimated value based on accepted model.

Additional References for Bioconcentration: None Found.

4.0 Ecotoxicity

4.1 Acute Toxicity to Fish:

Type:	**96-hour LC_{50}**
Species:	Fish
Value:	11,334 mg/L (log_{10} Kow of –0.07)
Method:	Modeled
GLP:	Not Applicable
Test Substance:	F3455.HCl
Results:	No additional data.
Reference:	Meylan, W. M. and P. H. Howard (1999). User's Guide for the ECOSAR Class Program, Version 0.993 (Mar 99), prepared for J. Vincent Nabholz and Gordon Cas, U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics, Washington, DC, prepared by Syracuse Research Corp., Environmental Science Center, Syracuse, NY 13210 (submitted for publication).
Reliability:	Estimated value based on accepted model.

Additional References for Acute Toxicity to Fish: None Found.

4.2 Acute Toxicity to Invertebrates:

Type:	**48-hour EC_{50}**
Species:	Daphnid
Value:	10,527 mg/L (log_{10} Kow of –0.07)
Method:	Modeled
GLP:	Not Applicable
Test Substance:	F3455.HCl
Results:	No additional data.
Reference:	Meylan, W. M. and P. H. Howard (1999). User's Guide for the ECOSAR Class Program, Version 0.993 (Mar 99), prepared for J. Vincent Nabholz and Gordon Cas, U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics, Washington, DC, prepared by Syracuse Research Corp., Environmental Science Center, Syracuse, NY 13210 (submitted for publication).

Reliability: Estimated value based on accepted model.

Additional References for Acute Toxicity to Invertebrates: None Found.

4.3 Acute Toxicity to Aquatic Plants:

Type:	**96-hour EC_{50}**
Species:	Green algae
Value:	5842 mg/L (log_{10} Kow of –0.07)
Method:	Modeled
GLP:	Not Applicable
Test Substance:	F3455.HCl
Results:	No additional data.
Reference:	Meylan, W. M. and P. H. Howard (1999). User's Guide for the ECOSAR Class Program, Version 0.993 (Mar 99), prepared for J. Vincent Nabholz and Gordon Cas, U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics, Washington, DC, prepared by Syracuse Research Corp., Environmental Science Center, Syracuse, NY 13210 (submitted for publication).
Reliability:	Estimated value based on accepted model.

Additional References for Acute Toxicity to Aquatic Plants: None Found.

5.0 Mammalian Toxicity

5.1 Acute Toxicity:

Type:	**Oral ALD**
Species/Strain:	Rats/ChR-CD
Value:	> 11,000 mg/kg
Method:	No specific test guideline was reported; however, a scientifically defensible approach was used to conduct the study. The test material, in original form, or as a solution in water, was administered to young adult male rats in single doses via intragastric intubation. Dose levels of 670, 1000, 1500, 2250, 3400, 5000, 7500, and 11,000 mg/kg were tested. One male rat was tested at each dose level. Survivors were sacrificed 13 or 14 days after dosing without pathological examinations.
GLP:	No
Test Substance:	Product as shipped (which contains 42% F3455.HCl)
Results:	No mortality was observed. Lethargy was observed on the day of dosing at 7500 and 11,000 mg/kg. Slight initial

	weight loss was evident at 670, 1500, 3400, 7500, and 11,000 mg/kg.
Reference:	DuPont Co. (1974). Unpublished Data, Haskell Laboratory Report No. 70-74 "Acute Oral Test" (February 13).
Reliability:	High because a scientifically defensible or guideline method was used.

Additional References for Acute Oral Toxicity: None Found.

Type: **Inhalation Toxicity:** No Data.

Type: **Dermal Toxicity:** No Data

Type: **Dermal Irritation:** No Data.

Type: **Dermal Sensitization:** No Data.

Type: **Eye Irritation:** No Data.

5.2 Repeated Dose Toxicity: No Data. Not a required endpoint.

5.3 Developmental Toxicity: No Data.

5.4 Reproductive Toxicity: No Data. Not a required endpoint.

5.5 Genetic Toxicity:

Type: ***In vitro*** **Genetic Toxicity Studies:** No Data.

Type: ***In vivo*** **Genetic Toxicity Studies:** No Data.

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December 17, 2002

ROBUST SUMMARY FOR CARBAMATE HYDROCHLORIDE

Summary

Carbamate hydrochloride (F3455.HCl) is a solid which is at least 50% soluble in water. No data are available on its melting point, and boiling point, density, and vapor pressure data are not applicable to this chemical. The product as shipped is a liquid, which contains F3455.HCl (35-51%), water (34-40%), dimethylamine hydrochloride (5-14%), and trimethylguanidine hydrochloride (1-5%). The product as shipped has a boiling point of 105ºC, a liquid density of 69.7 lb/ft^3 at 23ºC, and a vapor pressure of 18 mm Hg at 21ºC.

Environmental fate data for F-3455.HCl are generally not available. A review of estimated physical-chemical properties and environmental-fate characteristics based on output from EPIWIN 3.05 modeling software (Syracuse Research Corporation) indicates that F-3455.HCl is unlikely to represent a hazard as a persistent and/or bioaccumulative chemical (See Table 1). When modeled using a Level III fugacity model under a standard scenario of equal emissions to air, water, and soil, F-3455.HCl is expected to partition primarily into soil and water compartments. When dissolved in water at environmental pH, F-3455.HCl is expected to be mostly in an ionized form. Hydrolytic decomposition is not expected to readily transform F-3455.HCl, but F-3455.HCl may be subject to aqueous photolysis. Based on the BIOWIN ultimate survey model, F-3455.HCl, is expected to readily biodegrade.

Table 1 : Environmental Fate

Bioaccumulation*	BCF = 3.162
Biodegradation*	Readily biodegradable
Fugacity*	Level III Partition Estimate Air 0.005 % Water 45 % Soil 54.9 % Sediments 0.08 %
* Modeled data	

No aquatic toxicity information was available on carbamate hydrochloride. Modeling of physical-chemical parameters (i.e., log Kow) and aquatic toxicity was conducted to help provide insight into the behavior in the environment and the aquatic toxicity of F3455.HCl (See Table 2). Syracuse Research Corporation models for estimating physical-chemical properties were used to estimate $\log_{10}$ Kow (Meylan and Howard, 1995) for subsequent use in the ECOSAR program. ECOSAR (Meylan and Howard, 1999) was used to estimate aquatic toxicity data for green algae, daphnids (planktonic freshwater crustaceans), and fish. ECOSAR predictions are based on actual toxicity test data for classes of compounds with similar modes of action. The predicted

$\log_{10}$ Kow value was used as input for the ECOSAR model (see Table 2 for value). The ECOSAR predictions indicate that F3455.HCl is unlikely to be acutely toxic to algae, invertebrates, or fish at environmentally relevant concentrations. Since there are no analog chemicals with existing test data to lend support to the modeled data, acute toxicity screening tests are proposed with fish, *Daphnia*, and algae.

Table 2: Predicted Aquatic Toxicity Values

Parameter	**Estimated Value**
Log Kow	-0.07 @ 25ºC
96-hour LC_{50} (fish)	11,334 mg/L
48-hour EC_{50} (daphnid)	10,527 mg/L
96-hour EC_{50} (green algae)	5842 mg/L

The product as shipped has very low acute oral toxicity with an acute lethal dose (ALD) > 11,000 mg/kg in rats. Lethargy was observed on the day of dosing in animals administered 7500 and 11,000 mg/kg. Slight initial weight loss was evident at 670, 1500, 3400, 7500, and 11,000 mg/kg. No data regarding developmental and genetic toxicity was found. Therefore, a developmental study, *in vitro* bacterial reverse mutation assay, and *in vitro* clastogenicity study in human peripheral blood lymphocytes following OECD guidelines 414, 471, and 473, respectively are proposed. As described below, the test material is a closed system intermediate; therefore, repeated dose and reproductive toxicity endpoints are not required.

Human Exposure Information

F3455.HCl is manufactured at the DuPont Belle Plant and shipped to the DuPont LaPorte Plant. DuPont LaPorte is the only customer. The sites can have from 2 to 10 personnel working (construction, contractor, and plant employees) in the F3455.HCl operating areas. The areas where the substance is manufactured will have 2 operators present per shift during normal operations and 5 to 10 people during a shutdown or major construction activity.

The F3455.HCl is not present in the distributed product. There are a series of chemical reaction steps, and the F3455.HCl is consumed by chemical reaction. Chemical analysis of the product sold in commerce shows no detectable amount. The detection limit is estimated to be 0.1 wt% based on liquid chromatography.

Transport between the two locations is via dedicated rail cars or trucks. The F3455.HCl is shipped in bulk as the hydrochloride salt in water. Annual volume is 2.5-3 million pounds transported.

Controls during transport and transfer at the dispatching and receiving site are designed to ensure a closed system. This solution is pumped directly from the reactor to the railcar or truck for shipment. Normal shipment is by railcar. During loading of the railcar, the railcar dome is vented to the atmosphere. Because the aqueous salt solution has a low vapor pressure, the only significant exposure risk is as a result of a spill during loading of the railcar or truck. For railcars, spill containment including a stainless steel catch pan with a double-lined sump is provided for spill protection. Railcars are inspected to maintain the integrity of the fleet. The bottom valve of tank cars or trucks is checked by DuPont Belle operators when loading first starts (plug is removed to look for any liquid that may have leaked through the valve). The operator who loads the car wears appropriate PPE to guard against splashes. A checklist is completed for each shipment, to ensure that standard procedures are followed. Any spills, water used to wash equipment, etc., is sent to the biological treatment system on-site.

On receipt of the product at DuPont LaPorte, the solution is again handled in a closed system that includes pumping from the railcar or truck to the storage tank. It is consumed in the manufacturing process in a closed pipe and reactor system. The only significant exposure risk is during the unloading operation. The unloading spot is equipped with spill containment (catch pan) and the storage tank is diked. Any spills in these containment areas are disposed of by on-site incineration or biological treatment. Both the unloading spot and the storage tank vent to a flare. Unloading operators or others that might perform first breaks into equipment wear PPE to guard against splashes.

References for the Summary

Meylan, W. M. and P. H. Howard (1995). J. Pharm. Sci., 84:83-92.

Meylan, W. M. and P. H. Howard (1999). User's Guide for the ECOSAR Class Program, Version 0.993 (Mar 99), prepared for J. Vincent Nabholz and Gordon Cas, U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics, Washington, DC, prepared by Syracuse Research Corp., Environmental Science Center, Syracuse, NY 13210 (submitted for publication).